Clear Lake

Site Description

Location

Water designation number (WDN)	48-0032-00
Legal description	T126N-R53W-Sec.18,19 T126N-R54W-Sec. 12,13,14,24
County (ies)	Marshall
Location from nearest town	3.0 miles southeast of Lake City, SD

Survey Dates and Sampling Information

Survey dates	June 4, 2013 (EF-SMB) June 17, 2013 (EF-LMB) July 16-18, 2013 (FN, GN) October 9, 2013 (EF-WAE)
Electrofishing-SMB (min)	30
Electrofishing-LMB (min)	60
Frame net sets (n)	18
Gill net sets (n)	6
Electrofishing-WAE (min)	60

Morphometry (Figure 1)

Watershed area (acres)	21,826
Surface area (acres)	1,170
Maximum depth (ft)	20
Mean depth (ft)	12

Ownership and Public Access

Clear Lake is a meandered lake owned by the State of South Dakota and the fishery is managed by the SDGFP. A single public access site maintained by SDGFP is located on the southeastern shore. The access site includes a double-lane concrete boat ramp, dock, picnic area, and primitive restroom (Figure 1; Figure 2). Lands adjacent to Clear Lake are under mixed ownership including private individuals, Bureau of Indian Affairs, and SDGFP.

Watershed and Land Use

The Clear Lake watershed is primarily agricultural with a mix of hay/pasture land, cropland, and scattered shelterbelts.

Water Level Observations

The South Dakota Water Management Board established OHWM is 1823.7 fmsl and the outlet elevation of Clear Lake is 1822.5 fmsl. On May 22, 2013 the elevation was 1823.0 fmsl; 1.6 ft higher than the fall 2012 elevation of 1821.4 fmsl. The water level had declined to an elevation of 1822.3 fmsl on October 8, 2013.

Fish Management Information

Primary species	Largemouth Bass, Smallmouth Bass, Walleye, Yellow Perch
Other species	Black Bullhead, Black Crappie, Bluegill, Common Carp, Green Sunfish, Northern Pike, White Sucker
Lake-specific regulations	Largemouth/Smallmouth Bass: Only those less than 14", or 18" and longer may be taken. Of those no more than one may be 18" or longer. Walleye: minimum length 15".
Management classification	warm-water permanent
Fish consumption advisories	none

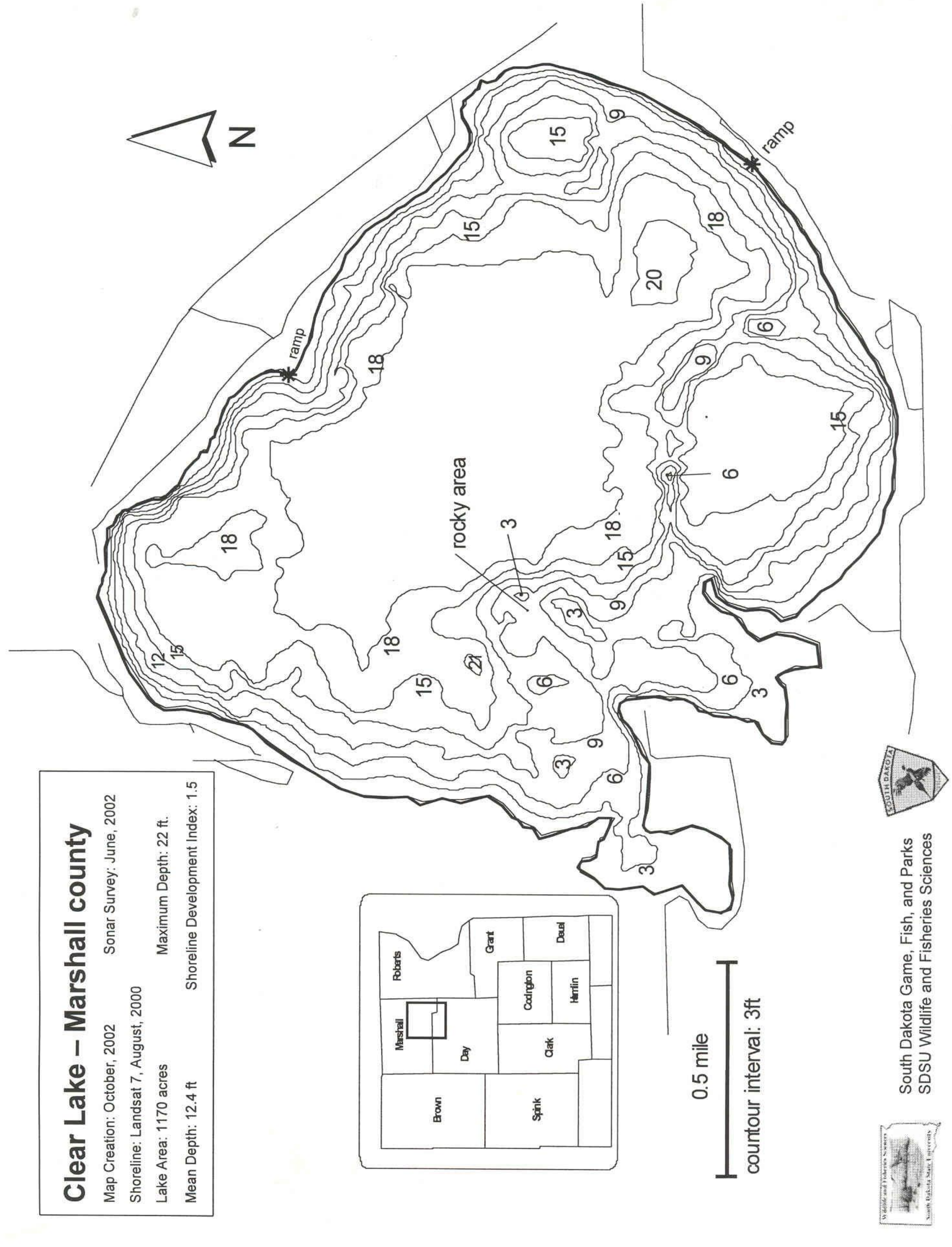

Figure 1. Map depicting depth contours and the access site for Clear Lake, Marshall County, South Dakota.

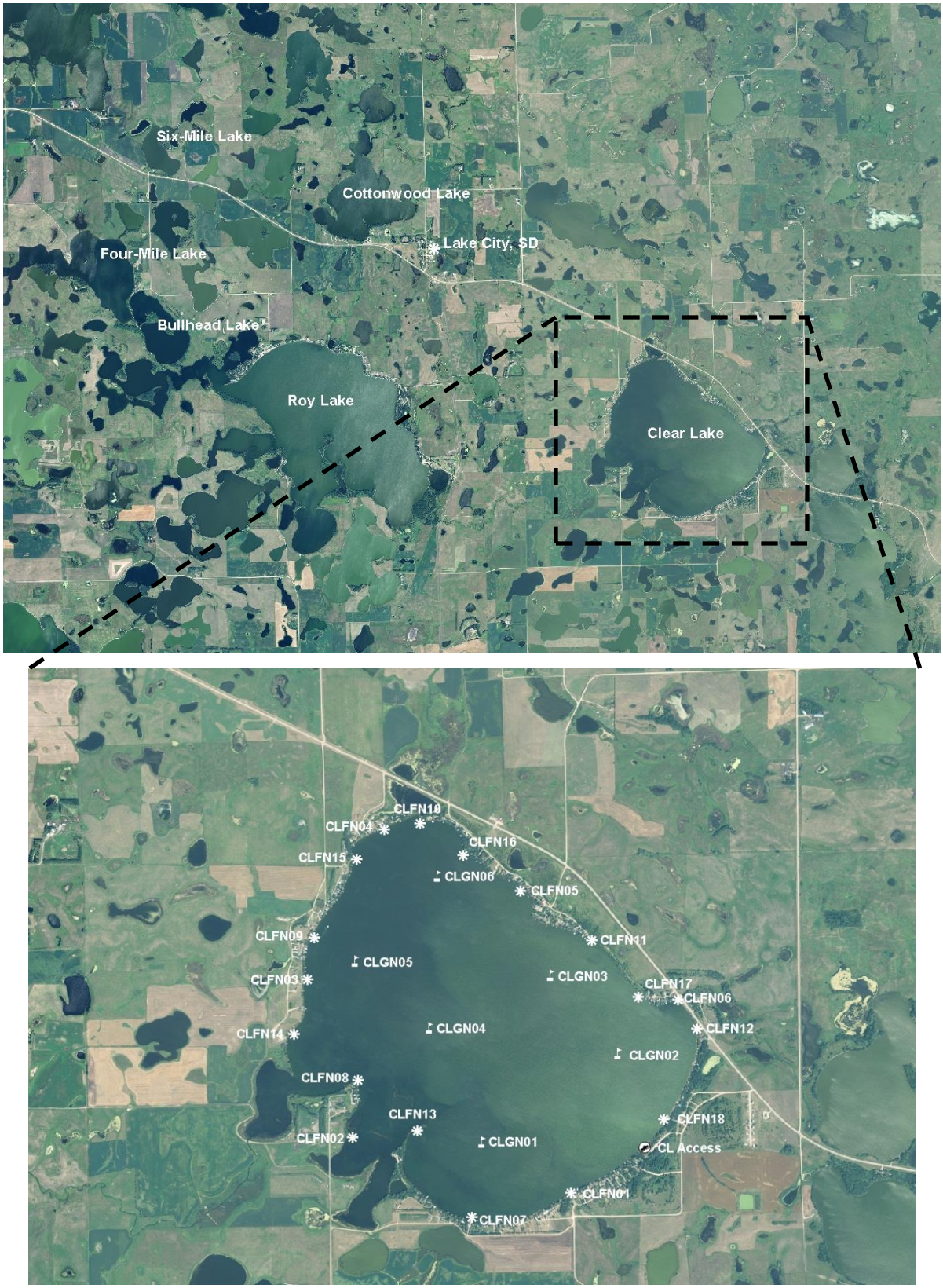

Figure 2. Map depicting geographic locations of Bullhead, Clear, Cottonwood, Four-Mile, Six-Mile, and Roy Lakes from Lake City, Marshall County, South Dakota (top). Also noted is the public access location and standardized net locations for Clear Lake (bottom). CLFN= frame net; CLGN= gill net

Management Objectives

1) Maintain a mean spring night electrofishing CPUE of stock-length Largemouth Bass ≥ 30, a PSD of 40-70, and a PSD-P of 10-40.

2) Maintain a moderate density Smallmouth Bass population with a PSD of 40-70, and a PSD-P of 10-40.

3) Maintain a mean gill net CPUE of stock-length Walleye ≥ 10, a PSD of 30-60, and a PSD-P of 5-10.

4) Maintain a mean gill net CPUE of stock-length Yellow Perch ≥ 30, a PSD of 30-60, and a PSD-P 5-10.

5) Maintain a mean frame net CPUE of stock-length Black Bullhead ≤ 100.

Results and Discussion

Clear Lake is a natural lake situated on the Coteau des Prairie. Two major surface water inlets to Clear Lake are located at the north shore and flow directly from the Red Iron Lakes and Long Lake. Water exiting Clear Lake flows into Roy Lake, then through a chain of other Coteau Lakes before eventually emptying into the James River. Currently, Clear Lake is managed as a black bass (Largemouth and Smallmouth bass), Walleye, and Yellow Perch fishery. Black Bullhead, Black Crappie, Bluegill, and Northern Pike also contribute to the fishery.

Primary Species

Largemouth bass: The spring night electrofishing mean CPUE of stock-length largemouth bass was 92.0 (Table 1) and above the minimum objective (≥30 stock-length largemouth bass/hour; Table 3). The 2013 spring night electrofishing CPUE represented a substantial increase from the 2011 CPUE of 54.0 (Table 2). Currently, relative abundance appears to be high in suitable habitat.

Largemouth bass sampled by spring night electrofishing ranged in total length from 20 to 51 cm (7.9 to 20.1 in), had a PSD of 43, and an PSD-P of 12 (Tables 1, 3; Figure 3). The PSD and PSD-P values are within the management objective ranges of 40-70 and 10-20, respectively, indicating a balanced population size structure (Figure 3).

Scales collected from a sub-sample of largemouth bass captured during spring night electrofishing indicated the presence of eight year classes (2003-2004, and 2006-2011; Table 4). Year classes produced in 2010 and 2011 were the most represented and collectively comprised 85% of largemouth bass in the electrofishing catch (Table 4).

Largemouth bass in Clear Lake tend to exhibit relatively-fast growth. In 2013, the mean back-calculated length at age-3 was 327 mm (12.9 in) compared to the region IV

and statewide mean of means of 266 mm and 250 mm (10.5 and 9.8 in; Willis et al. 2001; Table 4). Condition of largemouth bass, as indexed using Wr values may have been influenced by spawning activity during 2013, as spring night electrofishing was conducted during mid-June. Sampled largemouth bass had mean Wr values that ranged from 106 to 120 with the mean Wr of stock-length largemouth bass being 109 (Table 1). A slight increasing trend in Wr was observed as total length increased.

Smallmouth bass: Prior to 2009, fall night electrofishing was used to assess smallmouth bass populations in NE South Dakota. However, recent research has indicated that smallmouth bass population dynamics should be monitored utilizing standardized spring (May and June) night electrofishing over suitable habitat (i.e., rocky substrate) in northeastern South Dakota glacial lakes (Bacula 2009).

The mean spring night electrofishing CPUE of stock-length smallmouth bass was 30.0, which represented a substantial decrease from the 83.0 observed in 2011 (Table 1; Table 2). Smallmouth bass collected in the spring electrofishing catch ranged in total length from 19 to 48 cm (7.5 to 18.9 in.), had a PSD of 53 and PSD-P of 47 (Table 1; Table 3; Figure 4). The PSD was within objective range of 40-70; while the PSD-P was above the objective range of 10-20 (Table 3).

Prior to 2013, scales collected from a sub-sample of smallmouth bass captured during spring night electrofishing suggested consistent recruitment. However, in 2013 four year-classes were absent (2005-2006 and 2008-2009; Table 5). It is unknown whether mortality reduced these year-classes or their absence can be explained by sampling variability.

Smallmouth bass in Clear Lake tend to exhibit moderate to fast growth. In 2013, the mean back-calculated length at age-3 was 257 mm (10.1 in) compared to the region IV and statewide mean of means of 249 and 242 mm (9.8 and 9.5 in; Willis et al. 2001; Table 5). Condition of smallmouth bass, as indexed using Wr values may have been influenced by spawning activity during 2013, as spring night electrofishing was conducted during early-June. Smallmouth bass in the spring electrofishing catch had mean Wr values that ranged from 92 to 100 with the mean Wr of stock-length smallmouth bass being 95 (Table 1). A slight increasing trend in Wr was observed as total length increased.

Walleye: The mean gill net CPUE of stock-length Walleye was 10.7 (Table 1) and above the minimum objective (≥ 10 stock-length Walleye/net night; Table 3). Since 2004, the mean gill net CPUE has ranged from a low of 2.2 (2004) to a high of 10.7 (2013; Table 2). Based on the 2013 gill net CPUE, relative abundance is considered moderate.

Gill net captured Walleye ranged in TL from 24 to 70 cm (9.4 to 27.6 in), had a PSD of 22 and a PSD-P of 3 (Tables 1, 3; Figure 5). A large 2011 year class recruited to stock-length lowering the PSD and PSD-P values below the management objectives (30-60 and 5-10, respectively; Table 3).

Otoliths were collected from a sub-sample of gill net captured Walleye. Age structure information indicated the presence of four year classes (2007, 2009-2011; Table 6). The 2009 and 2011 cohorts coincided with fry stockings and comprised 26%

and 65%, respectively, of Walleye in the gill net catch (Tables 6, 8). In 2013, the mean fall night electrofishing CPUE of age-0 Walleye was 51.0 (Table 1) and indicated production of a moderate year class, which coincided with a fry stocking (Tables 1, 8). Recruitment of the 2013 cohort is currently unknown and will be assessed in future surveys.

In recent years, weak to moderate walleye year classes have been produced in both stocked (e.g., 2009 and 2011) and non-stocked (e.g., 2007 and 2010) years (Tables 6, 8). Walleye stocked in 2009 and 2011 were marked with Oxytetracycline (OTC) so that the contribution of stocked fish could be evaluated. The estimated stocking contribution for the 2009 and 2011 cohorts was 84% and 66%, respectively (Table 6).

Walleye in Clear Lake tend to exhibit moderate growth and typically attain quality length and the minimum length limit (38 cm; 15 in) by age 4 (Table 7). Since 2005, the weighted mean length at capture for age-3 Walleye has ranged from 317 to 428 mm (12.5 to 16.9 in); while the weighted mean length at capture for age-4 fish has ranged from 373 to 462 mm (14.7 to 18.2 in; Table 7). However due to low sample sizes, weighted mean TL at capture values may at times represent few walleye (Table 7). The 2009 year class had a weighted mean TL at capture of 394 mm (15.5 in) at age 4 (Table 7). Gill net captured Walleye had mean Wr values that ranged from 81 to 101 for all length categories (e.g., stock to quality) sampled. The mean Wr of stock-length Walleye was 89 (Table 1); a slight decreasing trend in condition was observed as TL increased.

Yellow Perch: The mean gill net CPUE of stock-length Yellow Perch was 40.1 (Table 1) and above the minimum objective (≥ 30 stock-length Yellow Perch/net night). Since 2004, the mean gill net CPUE has ranged from 5.0 (2004) to 122.3 (2011; Table 2). Based on the 2013 gill net catch, relative abundance appears to be high.

Gill net captured Yellow Perch ranged in TL from 9 to 24 cm (3.5 to 9.4 in; Figure 6). PSD was 32 and within the management objective range of 30-60 while PSD-P was 0 and below the management objective range of 5-10 (Table 3).

In recent years, Yellow Perch in Clear Lake have exhibited consistent recruitment (Table 9). Otoliths collected from a sub-sample of gill net captured yellow perch in 2013 indicated the presence of five consecutive year classes (2008-2012; Table 9).

The weighted mean TL at capture for age-2, age-3, and age-4 male Yellow Perch was 119, 159, and 178 mm (4.7, 6.3, and 7.0 in); while their female counterparts had weighted mean TL at capture values of 119, 174, and 201 mm (4.7, 6.9, and 7.9 in) at age 2, age 3, and age 4, respectively (Table 10). Gill net captured Yellow Perch had mean Wr values that ranged from 92 to 95 for all length categories (e.g., stock to quality) sampled. No length-related trend in Wr was observed.

Other Species

Black Bullhead: The mean frame net CPUE of stock-length Black Bullhead was 29.7 (Table 1) and within the objective (≤ 100 stock-length Black Bullhead/net night; Table 3). Since 2004, the mean frame net CPUE has ranged from a low of 0.6 (2009, 2010) to a high of 29.7 (2013; Table 2). Currently, relative abundance is considered moderate to high.

Frame net captured Black Bullhead ranged in TL from 12 to 40 cm (4.7 to 15.7 in; Figure 7). The PSD was 60 and the PSD-P was 5 (Table 1; Figure 7). No age or growth information was collected. A decreasing trend in condition was apparent as TL increased. Mean Wr values ranged from 83 to 103 for all length categories (e.g., stock to quality) sampled.

Black Crappie: The mean frame net CPUE for Black Crappie increased from 0.3 in 2010 to 5.2 in 2012 (Table 2). The mean frame net CPUE for Black Crappie increased again in 2013 to 10.7 (Table 1) and indicated high relative abundance.

No Black Crappie age and growth information was collected. However, the length frequency histogram indicates that the frame net catch was dominated by Black Crappie ranging in TL from 22 to 28 cm (8.7 to 11.0 in; Figure 8) which is likely a single year class. Black Crappie in Region IV natural lakes typically exhibit inconsistent recruitment resulting in sporadic increases in relative abundance.

Frame net captured Black Crappie had a PSD of 99 and a PSD-P of 58. Sampled Black Crappie were in good condition with mean Wr values ranging from 100 to 105 for all length categories (e.g., stock to quality) sampled. No length-related trend in Wr was observed.

Bluegill: The mean frame net CPUE of stock-length Bluegill was 39.0 (Table 1). Since 2004, the frame net mean CPUE has ranged from a low of 2.9 (2004) to a high of 39.0 (2013; Table 2). Based on the 2013 frame net CPUE, relative abundance appears to be high.

Frame net captured Bluegill ranged in TL from 4 to 23 cm (1.6 to 9.1 in), had a PSD of 43 and a PSD-P of 4 (Tables 1, 3; Figure 9). Otoliths were collected from a sub-sample of frame net captured Bluegill and suggested the presence of five year classes (2008-2012; Table 11). The 2010 and 2011cohorts were the most represented and comprised 37% and 61%, respectively, of Bluegill in the frame net catch (Table 11).

Bluegills in Clear Lake typically attain quality length (15 cm; 6 in) at age-3 (Table 12). Since 2006, the weighted mean TL at capture of age-3 bluegill has ranged from 156 to 209 mm (6.1 to 8.2 in; Table 12). The condition of sampled Bluegill was high, with Wr values ranging from 102 to 115 for all length categories (e.g., stock to quality) sampled. The mean Wr of stock-length Bluegill was 107 (Table 1) and an increasing trend in Wr was observed as total length increased. Seasonal influences (i.e., spawning behavior) may have influenced Wr values.

Northern Pike: Northern Pike typically are not sampled effectively during standardized mid-summer fish community surveys. As a result, mean gill net CPUE values are often low. Northern Pike relative abundance in Clear Lake has generally been considered low to moderate with mean gill net CPUE values that have ranged from 0.5 to 5.3 from 2004-2013 (Table 2). The 2013 mean gill net CPUE of stock-length Northern Pike was 3.8 (Table 1). Currently, relative abundance appears to be high.

Northern pike captured in the gill net catch ranged in TL from 43 to 86 cm (16.9 to 33.9 in), had a PSD of 52, and a PSD-P of 9 (Table 1). The condition of gill net captured Northern Pike was similar to that of Northern Pike captured from other

northeast South Dakota glacial lakes (e.g., Cattail/Kettle and Roy Lakes) with mean Wr values that ranged from 83 to 89 for all length categories (e.g., stock to quality) sampled. Stock-length Northern Pike had a mean Wr of 87 (Table 1) and no length-related trends in condition were apparent. Condition and size structure indices should be interpreted with caution as sample size was low (i.e., 23 stock-length Northern Pike).

Other: White Suckers were captured in low numbers during the 2013 survey (Table 1).

Management Recommendations

1) Conduct fish community assessment surveys annually (next survey scheduled in summer 2014) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.

2) Conduct spring night electrofishing on a biennial basis (odd years) to monitor Largemouth Bass and Smallmouth Bass population parameters.

3) Conduct fall night electrofishing on an annual basis to monitor age-0 Walleye relative abundance.

4) Collect otoliths from Bluegill, Walleye, and Yellow Perch; scales from Largemouth and Smallmouth bass to assess the age structure and growth rates of each population.

5) Stock Walleye at (≈500 fry/acre) to establish additional year classes if fall night electrofishing CPUE of age-0 Walleye and gill netting results warrant [i.e., low gill net CPUE of sub-stock (i.e., < 25 cm (10 in) Walleye and/or fall night electrofishing CPUE of age-0 Walleye < 75 fish/hour].

6) Maintain the 356-457 mm (14-18 in) protected slot length limit on Largemouth and Smallmouth Bass. The regulation is designed to increase the average size of black bass while allowing harvest of small bass to avoid slowing of growth (Blackwell and Lucchesi 2009).

7) Maintain the 381-mm (15 in) minimum length limit on Walleye. The regulation is designed to protect smaller fish from harvest and increase average fish size (Lucchesi and Blackwell 2009).

8) Partner with willing landowners on shoreline restoration projects designed to restore native plant fauna along highly-developed shorelines providing improvements to water quality and littoral habitats within the lake.

Table 1. Mean catch rate (CPUE; gill/frame net = catch/net night, electrofishing = catch/hour) of stock-length fish, proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish, and mean relative weight (Wr) of stock-length fish for various fish species captured using frame nets, experimental gill nets, and electrofishing in Clear Lake, 2013. Confidence intervals include 80 percent (± CI-80) or 90 percent (± CI-90). BLB= Black Bullhead; BLC= Black Crappie; BLG= Bluegill; LMB= largemouth Bass; NOP= Northern Pike; SMB= Smallmouth Bass; WAE= Walleye; WHS= White Sucker; YEP= Yellow Perch

	Abundance		Stock Density Indices				Condition	
Species	CPUE	CI-80	PSD	CI-90	PSD-P	CI-90	Wr	CI-90
Frame nets								
BLB	29.7	9.7	60	4	5	2	98	2
BLC	10.7	3.9	99	1	58	6	102	1
BLG	39.0	12.0	43	3	4	1	107	1
LMB	0.1	1.0	89	21	0	---	---	---
NOP	0.6	0.3	64	28	36	28	86	2
SMB	2.4	0.9	48	13	34	12	97	<1
WAE	0.4	0.4	75	31	25	31	84	1
WHS	0.1	0.1	100	0	100	0	99	10
YEP	3.9	1.6	32	10	0	---	85	<1
Gill nets								
BLB	20.3	4.1	59	7	2	2	101	1
BLC	6.2	3.6	100	0	76	12	105	1
BLG	0.3	0.5	0	---	0	---	138	6
NOP	3.8	1.8	52	18	9	10	87	1
SMB	4.3	2.3	58	17	35	17	103	2
WAE	10.7	1.4	22	9	3	4	89	<1
WHS	1.3	1.4	100	0	100	0	100	3
YEP	40.1	10.3	32	5	0	---	94	<1
Electrofishing								
LMB[1]	92.0	25.0	43	9	12	6	110	1
SMB[2]	30.0	15.0	53	24	47	24	95	3
WAE[3]	51.0	---	---	---	---	---	---	---

[1] Spring Electrofishing-LMB.
[2] Spring Electrofishing-SMB.
[3] Fall Electrofishing-WAE; catch rate (CPUE) represents age-0 Walleye/hour

Table 2. Historic mean catch rate (CPUE; gill/frame net = catch/net night, electrofishing = catch/hour) of stock-length fish for various fish species captured using frame nets, experimental gill nets and electrofishing in Clear Lake, 2004-2013. BLB= Black Bullhead; BLC= Black Crappie; BLG= Bluegill; COC= Common Carp; GSF= Green Sunfish; LMB= Largemouth Bass; NOP= Northern Pike; SMB= Smallmouth Bass; WAE= Walleye; WHS= White Sucker; YEP= Yellow Perch

	CPUE									
Species	2004	2005	2006[4]	2007[4]	2008	2009	2010	2011	2012	2013
Frame nets										
BLB	13.1	6.7	4.0	7.8	5.2	0.6	0.6	---	7.2	29.7
BLC	0.0	0.3	1.1	3.6	0.8	0.0	0.3	---	5.2	10.7
BLG	2.9	6.9	24.8	19.3	35.6	4.8	13.1	---	18.6	39.0
COC	0.0	0.6	0.1	0.1	0.0	0.0	0.0	---	0.1	0.0
GSF	0.0	0.0	0.1	0.0	0.1	0.0	0.0	---	0.0	0.0
LMB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	---	0.0	0.1
NOP	0.3	0.7	0.7	0.7	0.7	0.4	0.2	---	1.8	0.6
SMB	2.6	1.0	1.9	1.4	2.0	0.8	5.1	---	3.4	2.4
WAE	0.9	0.1	0.7	0.3	0.5	0.2	0.2	---	0.2	0.4
WHS	0.0	0.1	0.1	0.1	0.1	0.5	0.2	---	0.1	0.1
YEP	0.4	2.4	14.6	18.7	1.4	2.5	16.5	---	10.4	3.9
Gill nets										
BLB	15.2	9.2	2.2	6.5	4.8	0.2	0.0	0.2	7.5	20.3
BLC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	14.0	6.2
BLG	0.0	0.8	2.2	0.8	1.3	0.0	0.7	0.0	1.0	0.3
COC	0.3	0.2	2.7	2.0	0.3	0.2	0.0	0.2	0.0	0.0
NOP	1.7	0.5	1.5	5.3	2.2	0.7	1.3	2.7	3.3	3.8
SMB	2.3	3.8	2.8	1.2	2.0	4.0	7.8	2.5	2.0	4.3
WAE	2.2	4.8	6.0	6.8	6.2	6.0	4.8	6.8	4.2	10.7
WHS	0.7	0.7	1.2	1.2	1.0	1.8	3.3	3.3	5.2	1.3
YEP	5.0	17.5	39.5	117.2	20.8	15.0	82.8	122.3	84.8	40.1
Electrofishing										
LMB[1]	---	---	---	---	37.6	58.5	---	54.0	---	92.0
SMB[2]	---	---	---	---	---	89.5	---	83.0	---	30.0
WAE[3]	4.0	117.4	0.0	109.6	0.9	361.8	2.0	340.8	13.5	51.0

[1]Spring Electrofishing-LMB
[2]Spring Electrofishing-SMB
[3]Fall Electrofishing-WAE; catch rate (CPUE) represents age-0 Walleye/hour
[4] Monofilament gill net mesh size (0.75”, 1.00”, 1.25”, 1.50”, 2.00” and 2.50”)

Table 3. Mean catch rate (CPUE; gill/frame net = catch/net night, electrofishing = catch/hour), proportional size distribution for quality- (PSD) and preferred-length (PSD-P) fish, and relative weight (Wr) for selected species captured using frame nets, experimental gill nets, electrofishing in Clear Lake, 2004-2013. BLB= Black Bullhead; LMB= Largemouth Bass; SMB= Smallmouth Bass; WAE= Walleye; YEP= Yellow Perch

Species	2004	2005	2006[3]	2007[3]	2008	2009	2010	2011	2012	2013	Objective
Frame nets											
BLB											
CPUE	13	7	4	8	5	1	1	---	7	30	≤ 100
PSD	100	98	57	74	96	100	73	---	38	60	---
PSD-P	98	96	51	33	29	73	55	---	8	5	---
Wr	90	94	85	88	89	102	88	---	93	98	---
Gill nets											
WAE											
CPUE	2	5	6	7	6	6	5	7	4	11	≥ 10
PSD	85	59	61	41	24	53	72	32	32	22	30-60
PSD-P	31	21	33	15	8	11	14	10	16	3	5-10
Wr	88	88	89	90	89	93	91	88	90	89	---
YEP											
CPUE	5	18	40	117	21	15	83	122	85	40	≥ 30
PSD	67	9	30	15	10	0	0	0	14	32	30-60
PSD-P	17	4	1	1	1	0	0	0	0	0	5-10
Wr	98	96	99	100	98	99	103	98	98	94	---
Electrofishing											
LMB [1]											
CPUE	---	---	---	---	38	59	---	54	---	92	≥ 10
PSD	---	---	---	---	79	95	---	94	---	43	40-70
PSD-P	---	---	---	---	32	36	---	83	---	12	10-40
Wr	---	---	---	---	112	118	---	115	---	110	---
SMB [2]											
CPUE	---	---	---	---	---	90	---	83	---	30	---
PSD	---	---	---	---	---	48	---	55	---	53	40-70
PSD-P	---	---	---	---	---	38	---	41	---	47	10-40
Wr	---	---	---	---	---	102	---	105	---	95	---

[1] Spring Electrofishing-LMB.
[2] Spring Electrofishing-SMB.
[3] Monofilament gill net mesh size (0.75”, 1.00”, 1.25”, 1.50”, 2.00” and 2.50”).

Table 4. Mean back-calculated length (mm) at age and standard error (SE) for Largemouth Bass captured during spring night electrofishing in Clear Lake, 2013.

			Age									
Year	Age	N	1	2	3	4	5	6	7	8	9	10
2011	2	45	122	230								
2010	3	33	103	230	312							
2009	4	1	90	228	328	361						
2008	5	3	85	197	315	363	385					
2007	6	6	92	217	314	361	388	409				
2006	7	2	114	209	307	354	389	409	433			
2005	8	0										
2004	9	1	119	319	369	407	436	463	481	496	512	
2003	10	1	161	268	346	390	423	452	470	487	501	516
Mean		92	111	237	327	373	404	433	461	491	507	516
SE			9	14	9	9	11	14	14	4	5	
Mean Comparison [1]												
Small lakes/impoundments			99	183	246	299	332	---	---	---	---	---
Large lakes/impoundments			89	178	256	316	359	---	---	---	---	---
Region IV			80	180	266	325	356	---	---	---	---	---
Statewide			96	182	250	305	342	---	---	---	---	---

[1] Willis et al. 2001.

Table 5. Mean back-calculated length (mm) at age and standard error (SE) for Smallmouth Bass captured during spring electrofishing (day/night samples combined) in Clear Lake, 2013.

			Age										
Year	Age	N	1	2	3	4	5	6	7	8	9	10	11
2011	2	11	114	195									
2010	3	9	92	165	249								
2009	4	0											
2008	5	0											
2007	6	4	76	139	213	294	355	387					
2006	7	0											
2005	8	0											
2004	9	1	95	167	262	343	383	400	410	419	427		
2003	10	3	91	186	276	352	381	403	418	430	441	451	
2002	11	1	98	178	287	350	389	416	447	459	468	476	485
Mean		29	94	172	257	335	377	401	425	436	445	463	485
SE			5	8	13	14	7	6	11	12	12	12	
Mean Comparison [1]													
Small lakes/impoundments			98	180	241	291	---	---	---	---	---	---	
Large lakes/impoundments			92	169	237	304	335	---	---	---	---	---	
Region IV			96	179	249	316	339	---	---	---	---	---	
Statewide			91	171	242	300	333	---	---	---	---	---	

[1] Willis et al. 2001.

Table 6. Year class distribution based on the expanded age/length summary for Walleye sampled in gill nets and associated stocking history (# stocked x 1,000) from Clear Lake, 2009-2013.

	Year Class												
Survey Year	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001
2013			42	5	17		1						
2012[1]	---		4	3	15		1		3	1			1
2011	---	---		1	31	2	4		6	1			
2010[1]	---	---	---		11	2	11		9			1	1
2009[1]	---	---	---	---			16		15	2			1
# stocked													
fry	600	600	600[2]		600[3]				600		1200		1100
sm. fingerling													
lg. fingerling										62			

[1] Older walleye were sampled, but are not reported in this table.
[2] Stocked Walleye were OTC marked; 33 of 50 otoliths collected from fall electrofished age-0 walleye exhibited marks for an estimated stocking contribution of 66%.
[3] Stocked Walleye were OTC marked; 42 of 50 otoliths collected from fall electrofished age-0 walleye exhibited marks for an estimated stocking contribution of 84%.

Table 7. Weighted mean TL at capture (mm) for Walleye age-1 through age-10 sampled in experimental gill nets (expanded sample size) from Clear Lake, 2005-2013. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends.

	Age									
Year	1	2	3	4	5	6	7	8	9	10
2013[1]	---	278(42)	359(5)	394(17)	---	481(1)	---	---	---	---
2012[1]	194(4)	313(3)	348(15)	---	472(1)	---	561(3)	483(1)	---	---
2011	190(1)	272(31)	428(2)	462(4)	---	514(6)	481(1)	---	---	---
2010[1]	195(11)	306(2)	383(11)	---	471(9)	---	---	500(1)	615(1)	---
2009[1]	---	289(16)	---	409(15)	460(2)	---	---	555(1)	---	---
2008[1]	168(1)	---	317(28)	443(2)	480(2)	---	490(2)	---	---	---
2007	---	257(29)	378(7)	438(4)	---	470(2)	---	---	590(3)	608(4)
2006	182(5)	277(10)	360(6)	373(1)	478(5)	458(2)	---	584(2)	574(5)	571(5)
2005[1]	191(13)	279(9)	---	390(7)	413(6)	538(1)	527(3)	521(1)	458(1)	---

[1] Older walleye were sampled, but are not reported in this table

Table 8. Stocking history including size and number for fishes stocked into Clear Lake, 2001-2013. WAE= Walleye

Year	Species	Size	Number
2001	WAE	fry	1,100,100
2003	WAE	fry	1,200,000
2004	WAE	large fingerling	62,349
2005	WAE	fry	600,000
2009	WAE	fry	600,000
2011	WAE	fry	600,000
2012	WAE	fry	600,000
2013	WAE	fry	600,000

Table 9. Year class distribution based on the age/length summary for Yellow Perch sampled in gill nets from Clear Lake, 2009-2013.

	Year Class						
Survey Year	2013	2012	2011	2010	2009	2008	2007
2013		81	34	93	59	77	
2012	---		67	243	109	157	
2011	---	---		419	342	415	
2010	---	---	---		161	563	24
2009	---	---	---	---		842	90

Table 10. Weighted mean TL (mm) at capture by gender for Yellow Perch captured in experimental gill nets (expanded sample size) from Clear Lake, 2009-2013.

	Age				
Year	1	2	3	4	5
2013					
Male	98(33)	119(11)	159(3)	178(4)	204(12)
Female	99(44)	119(21)	174(55)	201(28)	221(59)
Combined	98(81)	123(34)	166(93)	187(59)	217(77)
2012					
Male	103(27)	144(74)	170(25)	181(46)	---
Female	102(22)	148(158)	184(95)	204(84)	---
Combined	102(67)	146(243)	178(109)	193(157)	---
2011					
Male	96(173)	138(89)	152(149)	---	---
Female	98(187)	142(258)	173(249)	---	---
Combined	97(419)	141(342)	164(415)	---	---
2010					
Male	99(53)	130(107)	---	---	---
Female	99(77)	142(406)	166(26)	---	---
Combined	99(161)	138(563)	167(24)	---	---
2009					
Male	97(268)	134(8)	---	---	---
Female	96(516)	139(82)	---	---	---
Combined	96(842)	139(90)	---	---	---

Table 11. Year class distribution based on the expanded age/length summary for Bluegill sampled in frame nets from Clear Lake, 2008-2013.

	Year Class												
Survey Year	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001
2013		1	435	267	5	10							
2012	---		12	282	39		1						
2010	---	---	---		2	211	15	10	1				
2009	---	---	---	---		1	58	24					
2008	---	---	---	---	---		82	387	110	54	7		2

Table 12. Weighted mean TL (mm) at capture for Bluegill sampled in frame nets (expanded sample size) from Clear Lake, 2006-2013.

	Age							
Year	1	2	3	4	5	6	7	8
2013	49(1)	120(435)	184(267)	213(5)	226(10)	---	---	---
2012	91(12)	156(282)	209(39)	---	244(1)	---	---	---
2010	78(2)	115(211)	164(15)	195(10)	224(1)	---	---	---
2009	71(1)	112(58)	159(24)	---	---	---	---	---
2008	95(82)	127(387)	161(110)	206(54)	234(7)	---	241(2)	---
2007	88(128)	143(144)	182(76)	209(16)	---	236(1)	---	---
2006	113(86)	140(318)	156(30)	---	---	---	---	259(2)

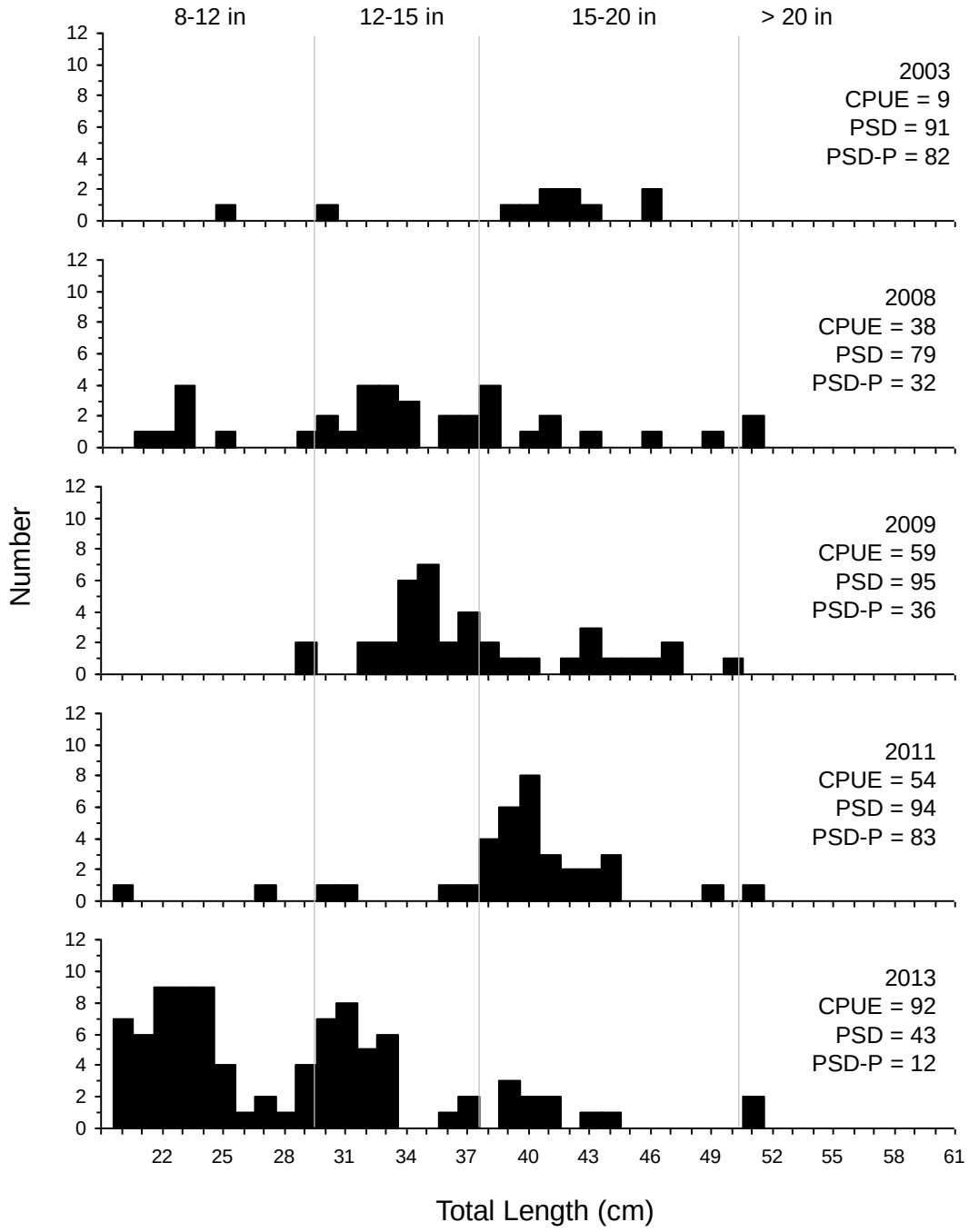

Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for largemouth bass captured during spring night electrofishing in Clear Lake, 2003-2013.

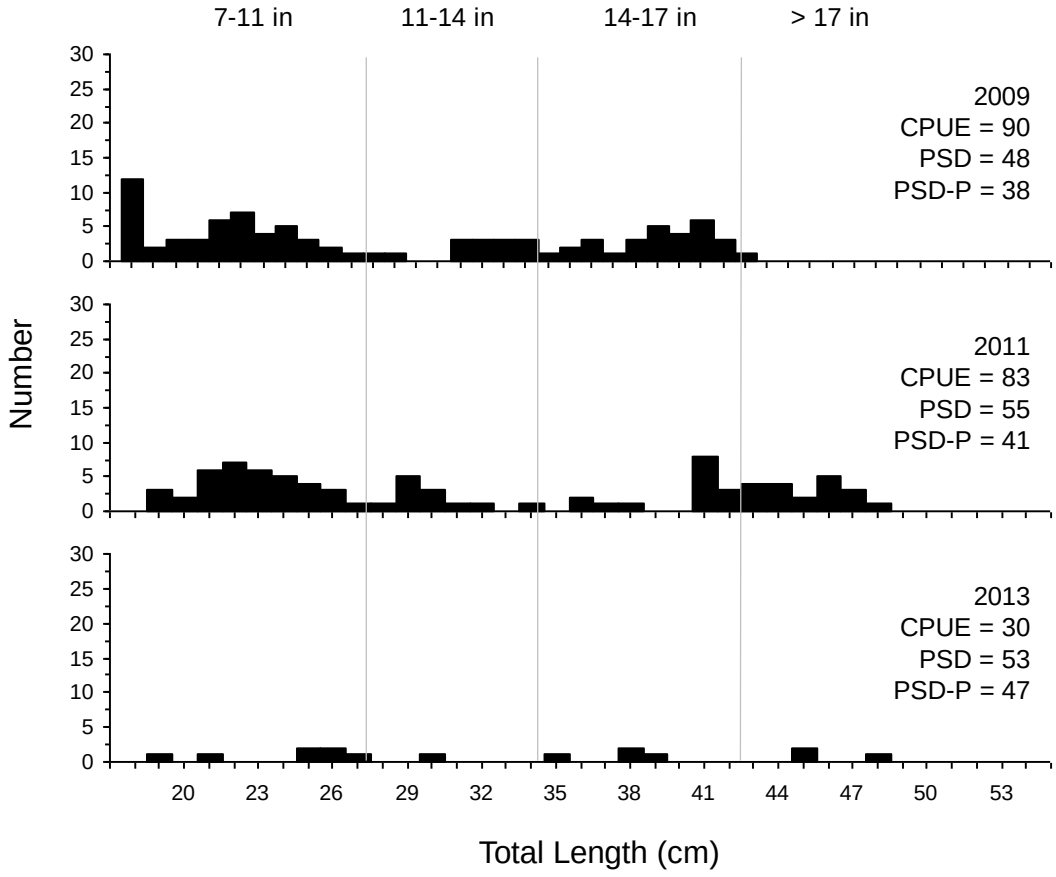

Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for smallmouth bass captured during spring night electrofishing in Clear Lake, 2009-2013.

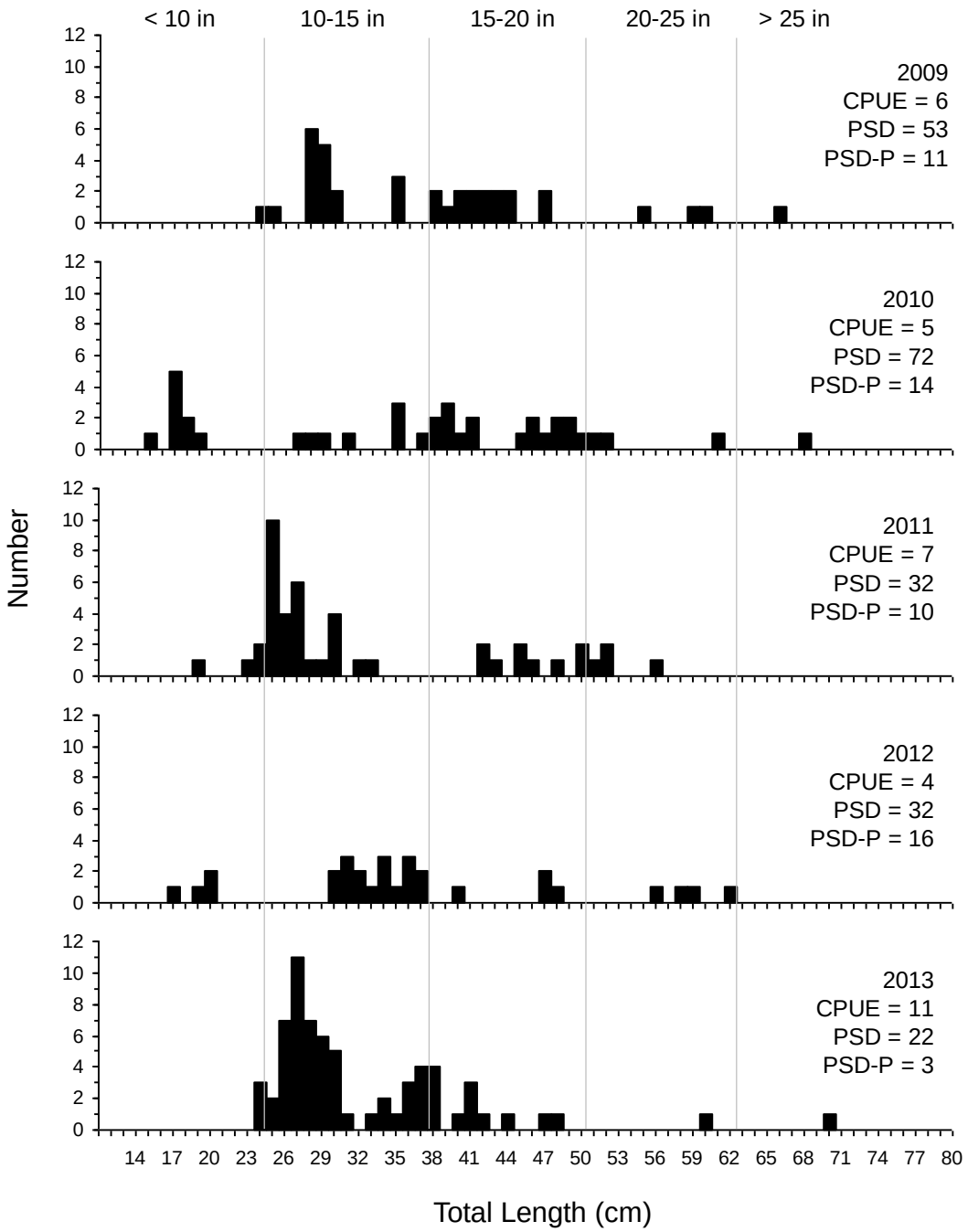

Figure 5. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Walleye captured using experimental gill nets in Clear Lake, 2009-2013.

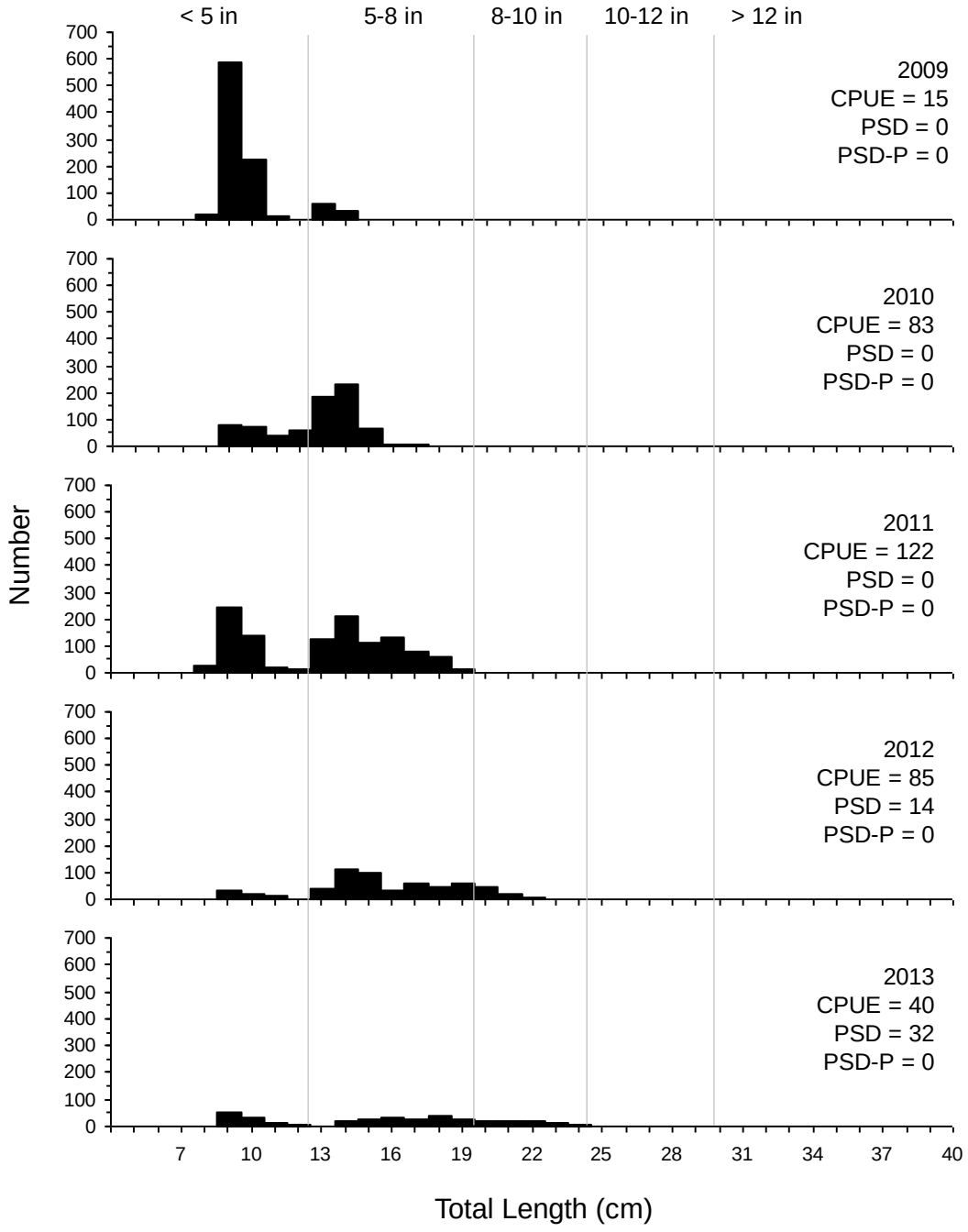

Figure 6. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Yellow Perch captured using experimental gill nets in Clear Lake, 2009-2013.

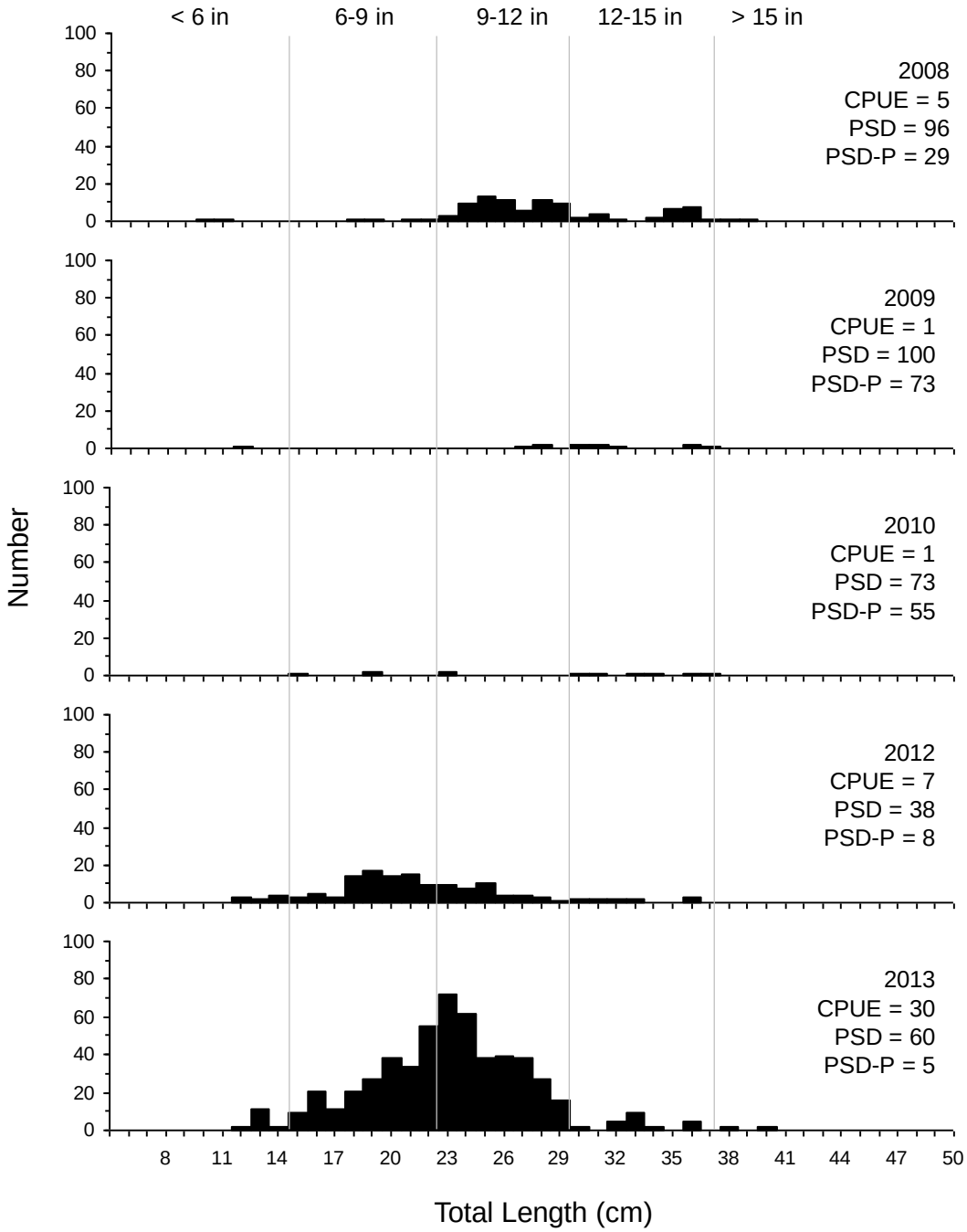

Figure 7. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Black Bullhead captured using frame nets in Clear Lake, 2008-2013.

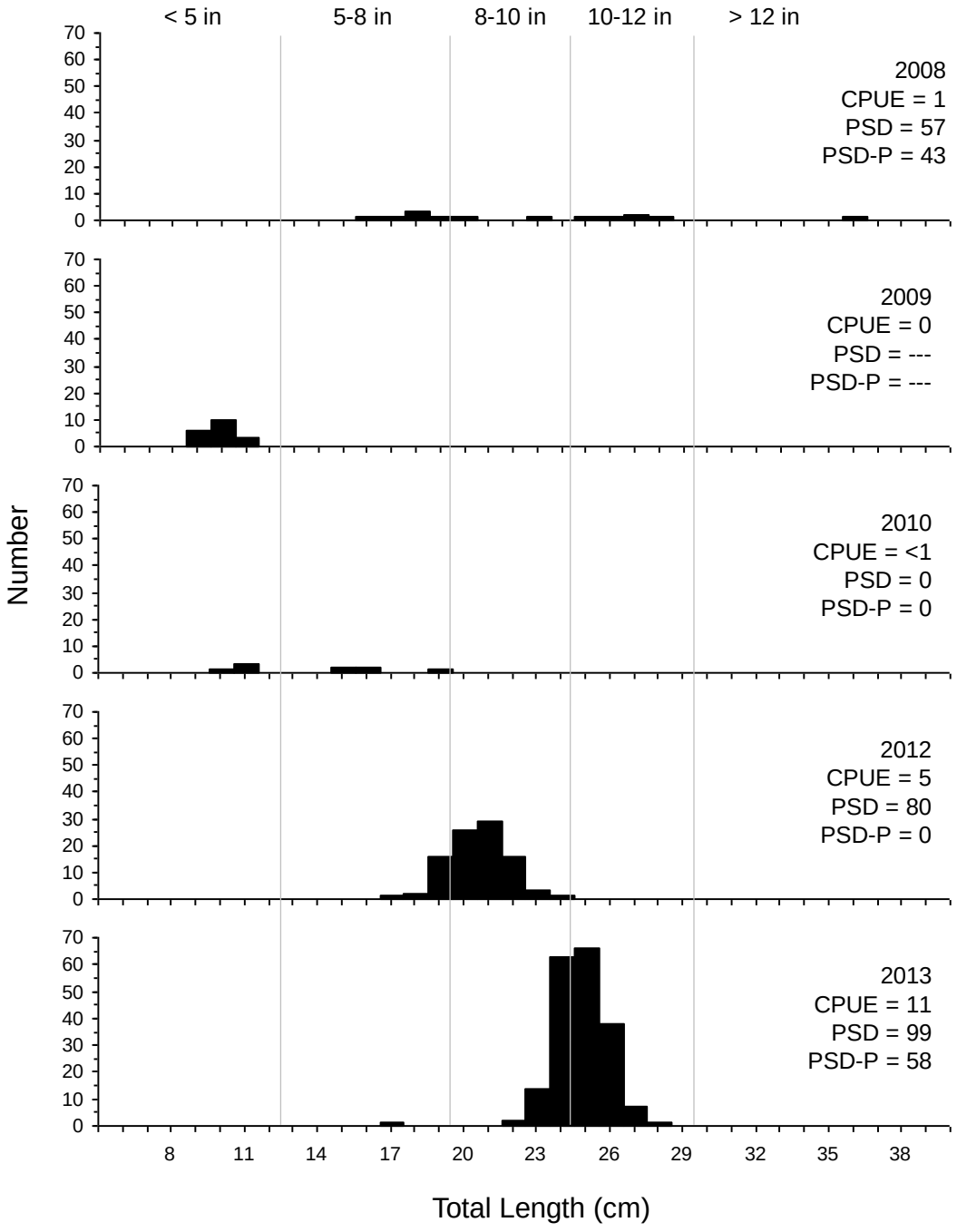

Figure 8. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Black Crappie captured using frame nets in Clear Lake, 2008-2013.

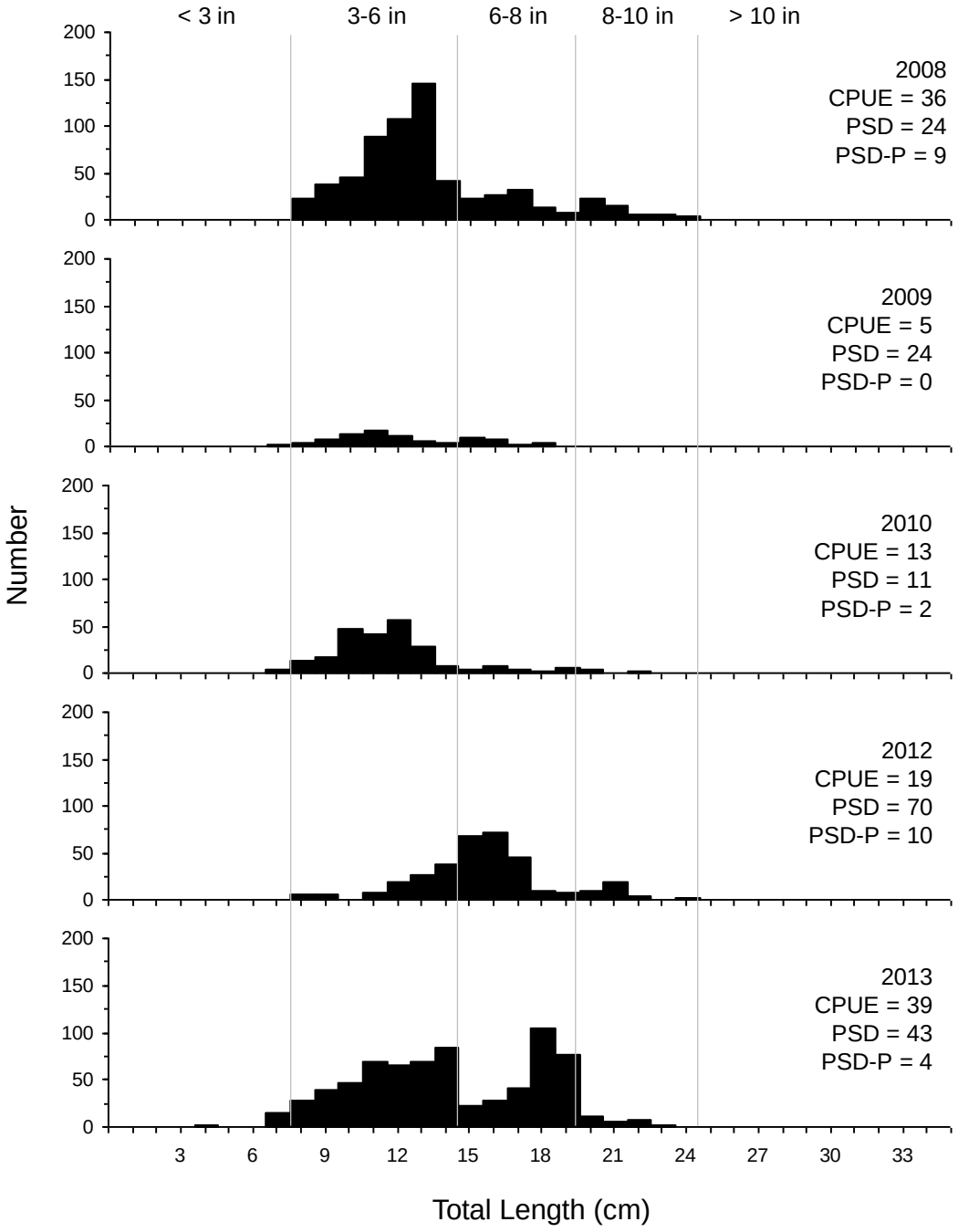

Figure 9. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Bluegill captured using frame nets in Clear Lake, 2008-2013.